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DEEP-SEA SHELLS FROM NEW SOUTH WALES.

By Allan R. Mayblom.

(Plate xxvi.)

During recent years I have done considerable collecting from the trawlers operating on the Continental Shelf on the New South Wales coast, with the result that many puzzling variations have been seen in some species obtained. In many cases this seems due to varying depth from which specimens are obtained. However, up to date it has been almost impossible to ascertain with any certainty the exact depth from which any individual specimen may come. This is due to the fact that the usual practice in trawling is to lower the net in, say, 70-80 fathoms, and to bring it up in 50-60 fathoms. The results of this are that all the shells living between these depths are brought in together with no possible check on the exact depth from which any one shell may have come. The majority of shells come from between these depths. However, sometimes the trawl is lowered to 110 fathoms and at times it only reaches 40 fathoms. It is during these latter trawls that the material obtained may help to give us an overall picture of the causes of changes in the shape, size and colour of many species. It seems certain that scientific trawling in exact depths with the aid of specially constructed dredges is the only satisfactory way in which to classify shells according to their variation.

Illustrated here are three possible examples of these changes. The first is in regard to the change in colour which is evident in the well-known *Livonia mamilla* Sowerby, 1844. This shell ranges in depth from 50-80 fathoms and deeper. However, from 70 fathoms they tend towards paleness in the aperture coloration. Then around 70-80 fathoms the occasional shell characterised by the pure porcelain white aperture is obtained. The latter is so well defined that I have given it the name of *leucostoma*. However, I am still rather doubtful as to whether this change is caused by depth, as the *leucostoma* does live together with the ordinary *mamilla* and also the change in colour is not gradual, but there is a sharp contrast between the two.

On the other hand, the rarer *Cymbiolena magnifica* Shaw and Nodder, 1808 (plate xxvi., fig. 2), occurs in comparatively shallow water, around 20 fathoms. Here the shell is quite ovate, broad, and the spire very short. However, an occasional shell is found in anything down to 60 fathoms, where it is larger, narrower and with a much longer spire. To this latter form I have given the subspecific name of *altispira*.

The now common, once rare, *Umbilia hesitata* Iredale, 1916, formerly *umbilicata*, was first found washed up on beaches in Bass Straits (coming from shallowish water). These shells were rather small, solid and well coloured. Years later it was found to be commonly occurring in intermediate depths, where it was larger, and on the whole, paler and thinner, while its form was very similar to the smaller shallow water type. As the depth increases, the shells still tend to become larger and paler until around 80-100 fathoms the pure white *howelli* Iredale, 1931, is sometimes found.

Another shell which appears to be greatly affected by depth is the common *Xenogalea stadialis* Hedley, 1914, which is found on the continental shelf of S.E. Australia in 40-100 fathoms. In shallow water the shell is small, usually averaging 65mm. However, the size increases rapidly with depth until in 80 fathoms shells up to 95mm. are commonly trawled.

With *Xenogalea thomsoni* Brazier, 1875, similarly sized specimens are also found. However, in this case the change is more marked because the smaller shells are more solid, the shouldering heavier and more pronounced, while the

nodules are very much in evidence. The larger shells are thinner, while at times the nodules are almost lost, especially on the lower whorl.

Berylsma waitei Hedley, 1903, is perhaps the best example of the change which takes place as the depth increases.

Berylsma waitei is found in 60-80 fathoms, and it is charactertised by a long spire and a very long canal, which give it a slender appearance. In about 25 fathoms the rare shorter spired relation of *waitei* is found. Here it is known as *Berylsma levifida* Iredale, 1924, while just below low water mark *Berylsma grandis* Gray, 1839, is found, having the general appearance of *waitei*, except the spire is shorter, shell fairly broad and the canal very short. Thus these three forms represent the change taking place in a shell in different depths.

Propefusus compositis is related to the shallow water form of *pyrulatus* Reeve, 1847. It is only very rarely found, due to its rather small size and probable rocky environment. Following on the lines of *Berylsma waitei*, it is thin and elongate and the very long and thin canal is quite characteristic.

A form of the well-known South Australian shell *Ericusa papillosa* Swainson, 1822, is found in southern New South Wales and Victorian waters, where it is known as *kenyoniana* Brazier, 1898. The latter form is quite variable in size, is more elongate than *papillosa*, and the exterior of the shell is marked with longitudinal ribs, which are especially prominent on smaller shells. While at first *kenyoniana* and *papillosa* were thought to be distinct, I have received from the trawlers many smooth specimens, some of which are not separate from the typical South Australian *papillosa* type. This suggests that *kenyoniana* is merely the deeper water form of *papillosa*, and this agrees with Verco's experience in the deep water of the Great Australian Bight. There he secured a small ribbed shell very like *kenyoniana*.

A small narrow, smooth form of *papillosa* has been secured in the northern sea of New South Wales, and has been named *Ericusa sericata* Thornley, 1951.

One of the most interesting finds is quite a new record for Australia. Some time ago a shell looking like half *Tonna* and half *Cassis* was brought in. It was something quite new, and while it was being considered and checked, I received a Japanese shell from America which was inseparable from the shell obtained here. The name of the shell received was *Eudolium pyriforme* Sowerby. Since then I have received a number from the trawlers, and the only possible difference between them and the Japanese type is the size, our shells apparently growing much bigger.

This shell affords an excellent illustration as to the similarity between some of our shells and those found in Japanese and Chinese waters. This is a remarkable fact, because in tropical waters separating these two geographical areas there occurs a completely different form of shell life, for the most part quite unlike anything found here or in Japan. Another classic example is the well-known *Tolema sertata* Hedley, 1903, which was at first recorded as *lischkeana* Dunker, 1852.

Family Volutidae.

Cymbiolena magnifica altispira, subsp. nov.

(Plate xxvi., fig. 1)

Shell large ovate and rather opaque; spire one-fourth overall length of shell and consisting of three whorls; apex comparatively small and rounded; nucleus containing three regularly round whorls; aperture large, narrowly ovate; columella marked with four large distinct orange coloured pleats.

The external colour is a brownish interlaced with white background overlaid with three bands of irregular chestnut and black markings. The aperture is a pale peach colour, and in live shells there is brownish band round the inner edge of the outer lip.

This shell differs only in shape, the outstanding point being the height of the spire, which is often twice as long in a specimen of *altispira* as in a similar sized specimen of the species. The shell is narrower, with the spire more conical and the aperture quite slender in comparison. A true *magnifica* is similar in appearance to a *Melo*, the aperture being extremely large and outer lip rounded, while the spire is short and very ventricose. In the case of *V. magnifica* the posterior canal ends quite close to the suture, while in *altispira* the canal ends two or three times further away from the suture.

Hab.: Usually occurs in deep water. They have been trapped alive as deep as 60 fathoms, and as a general rule the deeper they are the longer and more slender the shell.

Loc.: Port Stephens to Botany Bay.

Comparison of Measurements.

	altispira	*magnifica*
Total length	$9\frac{3}{8}''$	$9''$
Length of aperture	$7\frac{1}{8}''$	$7\frac{7}{8}''$
Length of spire	$2\frac{1}{4}''$	$1\frac{1}{8}''$
Width of aperture	$3\frac{1}{8}''$	$3\frac{3}{8}''$
Width of shell	$5\frac{1}{4}''$	$5\frac{1}{4}''$
Width of shoulder	$4\frac{3}{8}''$	$4\frac{5}{8}''$

Livonia mamilla leucostoma, subsp. nov.

(Plate xxvi., fig. 3)

Length: 200 — 250 mm.

Breadth: 130 mm.

Shell ovate, spire one-fifth of length, nucleus consists of one large mamilliform whorl with the apex very eccentric and lower down on one side; surface is wrinkled and of white to dirty white in colour. There are two and one-half post nuclear whorls; suture distinct and irregularly undulated. Lip thin and strongly recurved, extended slightly outwards and advancing upwards three-quarters of the height of the penultimate whorl. Anterior canal short, broad and open. Columella shallow, showing three distinct plaits, the upper one less pronounced.

Colour, tan, with a darker brown band below the suture; to a dirty white in some shells. Shell longitudinally irregularly marked with a broken design of brownish triangular streaks. Aperture is of a pure white porcelain colour. Base of last whorl is darker, showing distinctly a sinuation.

In shape and structure this shell agrees with the species, the colour of the aperture, which is brown in the species, and nucleus being the only distinction.

It is believed that this shell does not grow quite as large as the species and is generally thinner, the largest shell known to the author being $11\frac{1}{2}$ inches against 13 inches in the species.

Distribution: Generally below 80 fathoms around Gabo Is. in southern New South Wales seas.

Specimens have been reported as being very thin and almost pure white and coming from greater depths, but none have yet been brought to land.

Family Fusinidae.

Propefusus compositis, sp. nov.

(Plate xxvi., fig. 4)

Length: 70 — 100 mm.

Shell fusiform; spire long, pointed, almost half length of shell, rounded with rather a deep suture and consisting of seven whorls; nucleus white and containing

two whorls which end in a sharp point; aperture ovate; canal long, narrow slightly curved and open.

The penultimate whorl has six prominent encircling ridges with a smaller one suturally and an evanesent one anteriorly; the interstices rather wide and longitudinally ridged with about 15 elevated ribs which may become less marked and up to twenty on the last whorl. In some the longitudinal ridges are even more prominent and fewer in number. Inside the aperture the encircling ridges leave corresponding hollows through the rather thin outer wall, giving it a corrugated appearance.

The shell is coloured dirty white and covered with a tough thin brown epidermis. The longitudinal ridges are marked with a rusty line which shows clearly through the epidermis and giving it a brindled appearance.

Hab.: These shells would be more inclined to live in a rocky rather than a sandy environment, as they are only very occasionally caught. They are believed to live in 50-80 fathoms.

Loc.: Gabo Is. of southern New South Wales and extending into Victorian waters.

EXPLANATION OF PLATE xxvi.

Fig. 1: *Cymbiolena magnifica altispira* Mayblom.

Fig. 2: *Cymbiolena magnifica magnifica* Shaw & Nodder.

Fig. 3. *Livonia mamilla leucostoma* Mayblom.

Fig. 4: *Propefusus compositis* Mayblom.

Photo.—G. McGrath.

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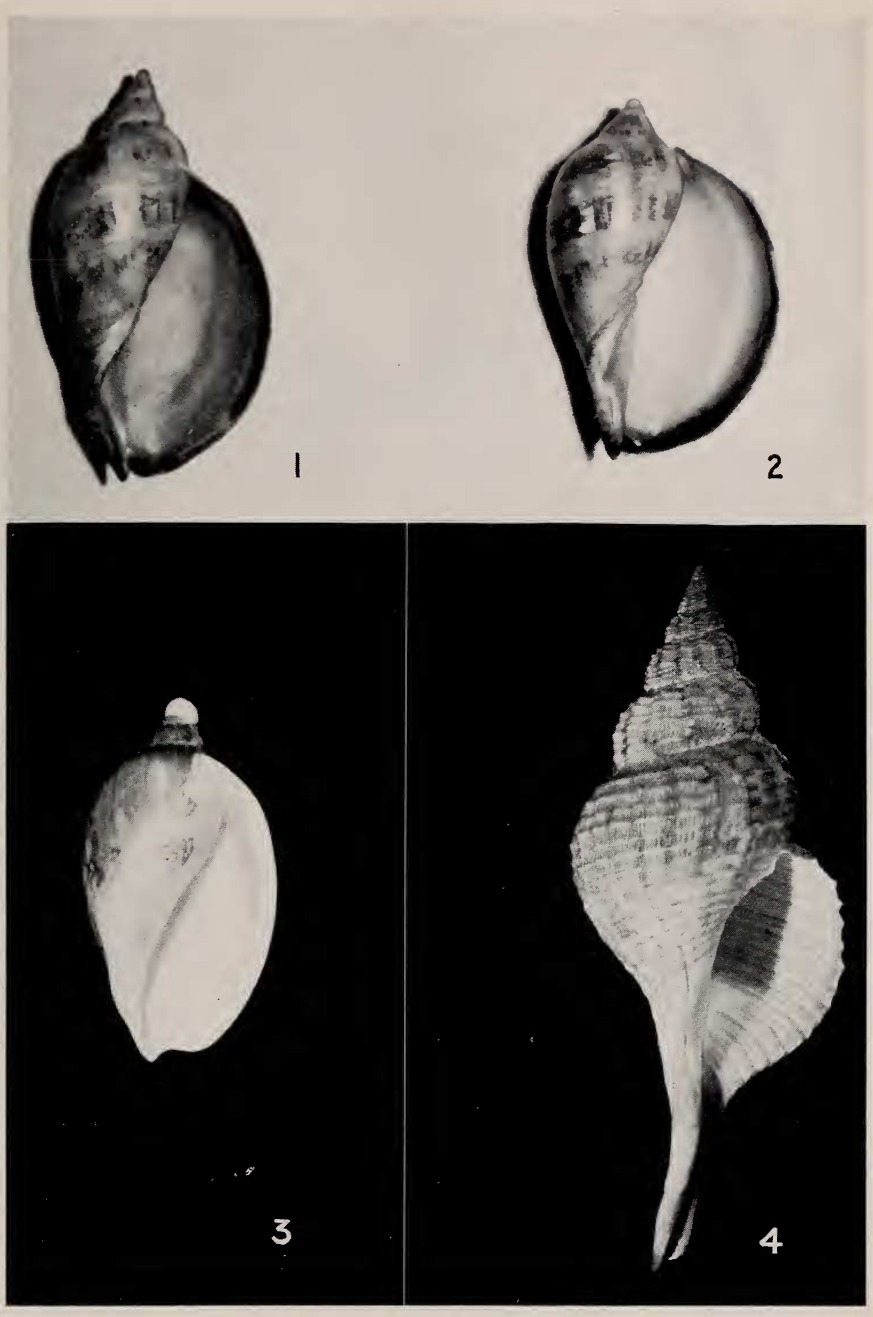

Deep-sea Shells.

Photo.—G. McGrath.